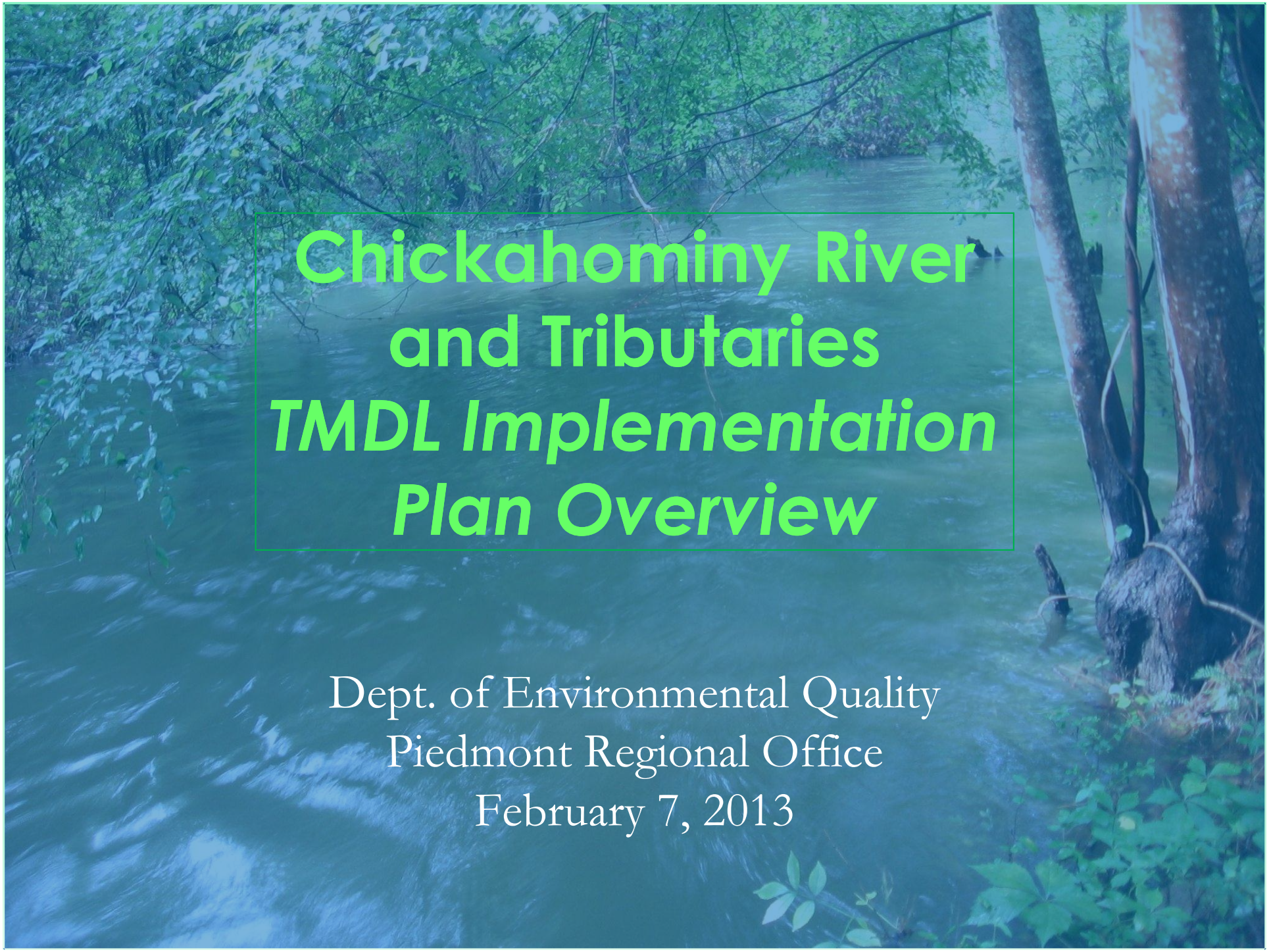


Chickahominy River and Tributaries *TMDL Implementation Plan Overview*

Dept. of Environmental Quality
Piedmont Regional Office
February 7, 2013

Acknowledgements

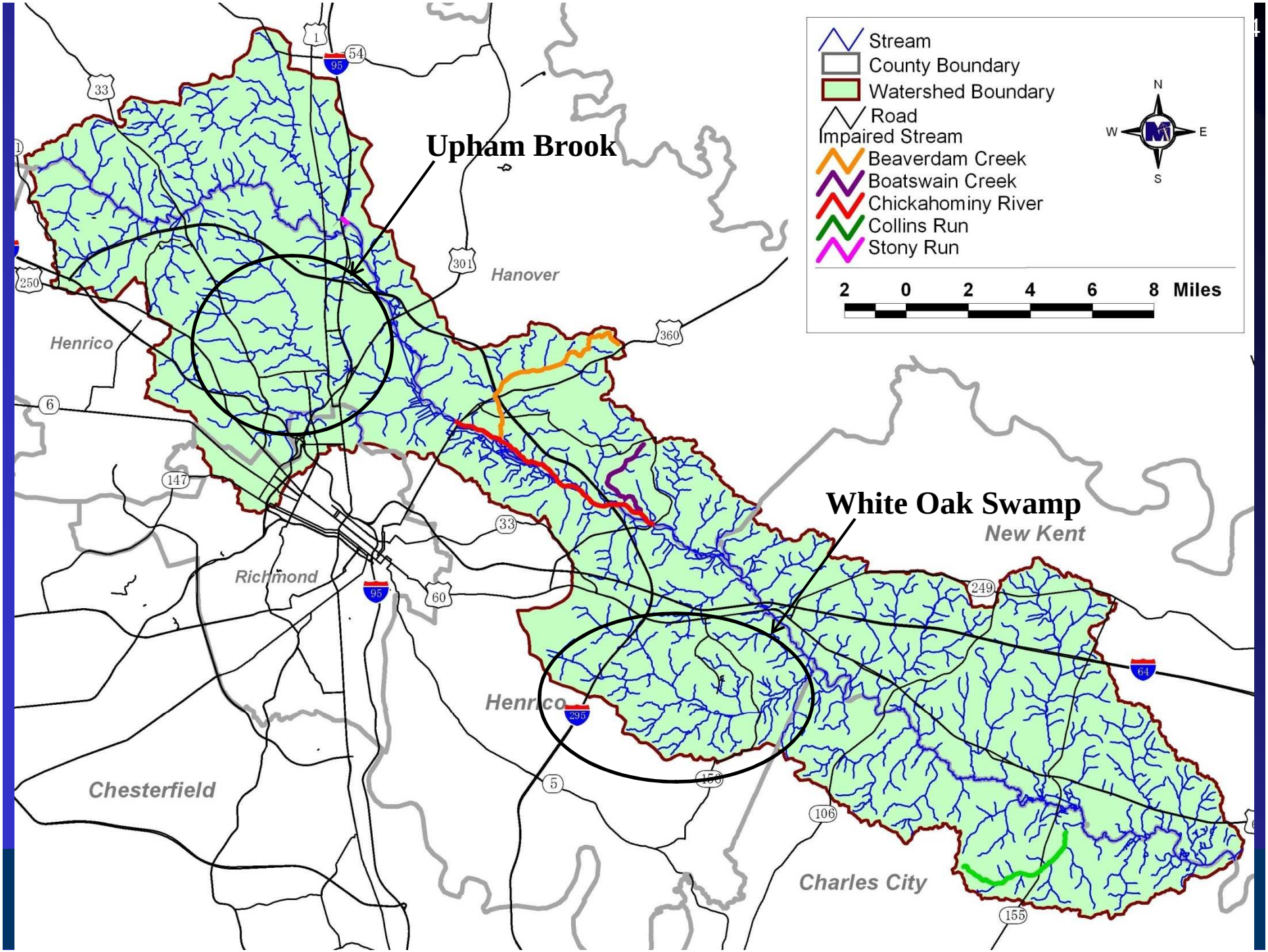
- Steering committee and working group members
- Residents of the Chickahominy watershed
- Henrico, Hanover, Charles City, and New Kent Counties
- City of Richmond
- Soil and Water Conservation Districts
- VA Department of Health
- VA Department of Conservation and Recreation
- VA Department of Environmental Quality
- VA Department of Game and Inland Fisheries

Thank you for all of your assistance and input throughout this process!

Bacteria Impairment Descriptions

- **Collins Run**
  - (VAP-G07_CNR01A00) headwaters to river mile 0.99 (4.50 mi)
- **Beaverdam Creek**
  - (VAP-G06R_BEV01A00) headwaters to Chickahominy River (6.69 mi)
- **Boatswain Creek**
  - (VAP-G06R_CHK01A98) headwaters to the Chickahominy River (3.76 mi)
- **Chickahominy River**
  - (VAP-G06R_CHK01A98) route 360 bridge to route 156 bridge (7.54 mi)
- **Stony Run**
  - (VAP-G05R_SNF01A02) from Lickinghole Creek to Chickahominy River (0.21 mi)

Also included in the project are impairments within White Oak Swamp and Upham Brook (TMDL development in 2004 and 2008)


Upham Brook
White Oak Swamp
Stream
County Boundary
Watershed Boundary
Road
Impaired Stream
Beaverdam Creek
Boatswain Creek
Chickahominy River
Collins Run
Stony Run
N
W
E
S
2 0 2 4 6 8 Miles
Hanover
Henrico
Richmond
Chesterfield
New Kent
Charles City
Henrico

What is a TMDL?

- Total Maximum Daily Load (TMDL) is a term used to describe the amount of pollution a stream can receive and still meet Water Quality Standards (AKA "pollution diet")
- Water quality standards are regulations based on federal or state law that set numeric or narrative limits on pollutants
- TMDLs are required for water bodies that are determined to be impaired due to exceedance of water quality standards

Why do we need to improve water quality?

- The Chickahominy River and Tributaries do not meet water quality standards for bacteria (2010 303(d) lists)
- Total Maximum Daily Load (TMDL) studies developed in 2004, 2008 and 2012.
  - Identified the sources of bacteria in the streams and the reductions needed

What are the benefits of this process?

- Economic benefits:
  - Agricultural producers
  - Homeowners
  - Local economy
- Water quality benefits:
  - Environmental
  - Human health

Review of the TMDL

% Reduction in Fecal Bacteria Loading From Existing Conditions*

Wildlife Direct Deposition	Forest, Wetlands, Barren[1], Comm.	Livestock Direct Deposition	Cropland, Pasture, LAX[2]	SSOs[3]	Straight Pipes	Developed
77	77	100	99	100	100	99

[1]Barren - Areas of bedrock, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
[2]LAX - livestock pasture access near flowing streams.
[3]SSOs – Sanitary Sewer Overflows

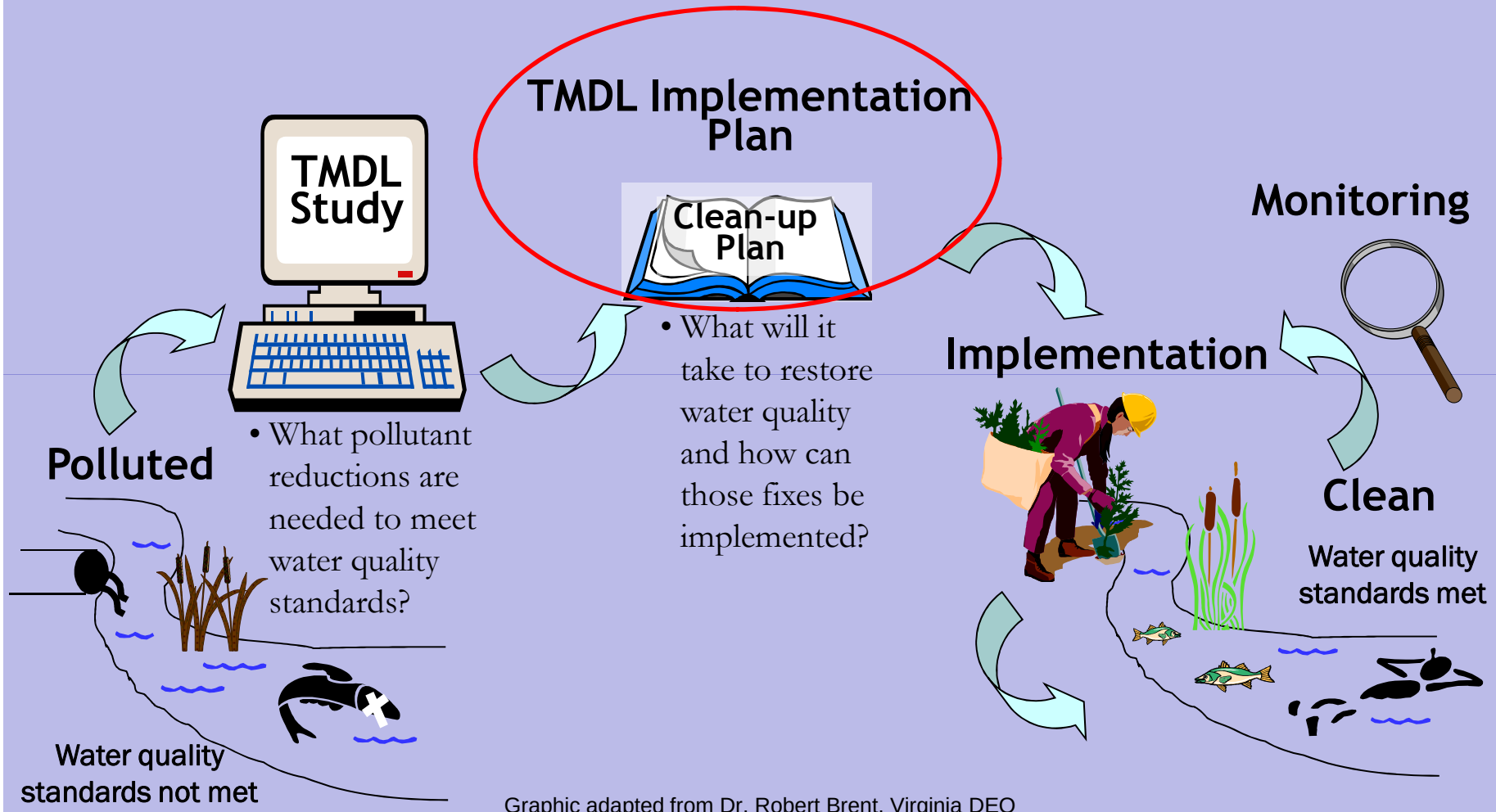
*White Oak Swamp and Tuckahoe Creek reductions similar

TMDL Document Available online at:
www.deq.virginia.gov/Water/WaterQualityInformationTMDLs/TMDL.aspx

Reductions in TMDL indicate:

- Failing septic systems, straight pipes, sewer overflows must be corrected
- Owners must pick up after their pets
- Livestock must be excluded from streams
- Bacteria running off the land during rain events must be reduced, trapped, and/or filtered in buffers before entering the stream

Overview of TMDL Process



Graphic adapted from Dr. Robert Brent, Virginia DEQ

TMDL Implementation Plan Development

- TMDL study tells us how much reductions are needed and TMDL Implementation Plan recommends one path by which reductions can be achieved and what it will cost
- Outlines recommended actions to improve water quality
- Serves as a guide for implementation efforts and can facilitate funding efforts

Public Participation

- Kicked off the process end of May '12
- Working group meetings
  - Agricultural – June & Aug '12
  - Residential/Government – June & Aug '12
- Steering committee – Nov '12

- Final public meeting – 2/7/2013
- Public Comment Period and completion of the draft plan
  - Public comments will be accepted through 3/11/2013
- Implementation is already happening in the watershed

Best Management Practices (BMPs) already Installed!

- Streamside Livestock Fencing ~ 0.6 miles
- Reforestation of Erodible Crop/Pasture ~2.3 acres
- Cover Crops ~217.1 acres
- Grass Filter Strips ~2.75 acres
- Continuous No-Till ~1,515.6 acres
- Long Term Continuous No-Till ~1,944.6 acres
- Retention Basins (ponds) in Hanover County with drainage area of 4970.8 acres

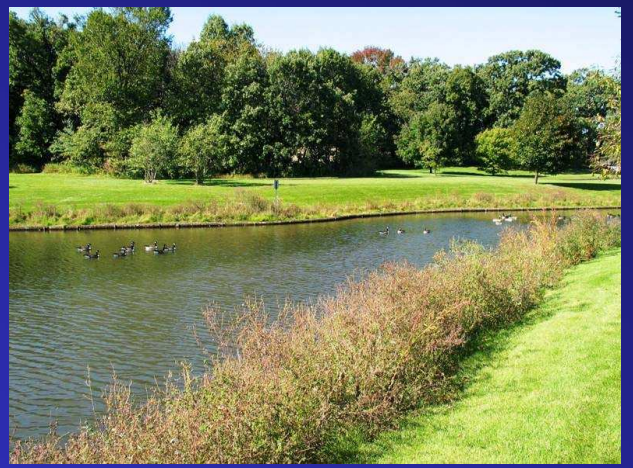
What BMPs are in the plan?

Stage I (first 5-years):

First stage include BMPs which are the biggest "Bang-for-the-Buck", easiest to implement, and most cost-effective

Assessment of Needs

- Identification of best management practices (BMP) to reduce bacteria
  - Agricultural
  - Residential
- Technical assistance needed for implementation of the plan (staffing needs)



Agricultural Best Management Practices Recommended

- **~18 miles of Streamside Livestock Fencing**
  - 100% direct load efficiency; 100% buffer efficiency, 50% upland efficiency
  - Includes:
    - **13** LE-1T, **2** WP-2T on perennial streams and **41** non-cost-share systems (intermittent streams) for cattle and 29 non-cost-share for horses (not eligible for costshare)
- **Increase Conservation Tillage by 419 acres**
  - 61% land use efficiency
- **10,000 feet of Vegetated Buffer on Cropland**
  - 100% buffer efficiency, 50% upland efficiency
- **11,623 acres Prescribed Grazing Plan and Implementation (NRCS 528)**
  - 61% land use efficiency
- **Horse Manure Education/Waste Composting Program (143 sheds, 1 education program)**
  - 99% source efficiency associated with composting shed

Exclusion Practices

LE-1T (13*); *Livestock Exclusion with Riparian Buffer (LE-1T) systems:*

- streamside fencing
- interior fencing
- alternative watering system
- 35-ft buffer from the stream
- maximum of 85% cost share.

(100% direct load efficiency; 100% buffer efficiency, 50% upland efficiency)

WP-2T (2*); *TMDL Support for Stream Protection (WP-2T):*

- 35-ft buffer
- hardened crossings
- Maximum 75% cost share.

(100% direct load efficiency; 100% buffer efficiency, 50% upland efficiency)

Non-Cost share Cattle Systems (41*) are where only intermittent streams are accessed by cattle

**Average local system length: 1,100 ft*

Horse Waste Management Practices

Recreational horse-owners don't qualify for cost-share funds. Many horses live within Chickahominy watershed and waste management issues were identified during working group meetings. Funding sources must be sought for these practices:

Horse Waste-Management Education Program (1 Program); website development and maintenance, print materials, workshops, and demonstration farm with established waste-management BMPs.

Horse Waste Shed (143); covered pad for horse waste storage (shed number is 1 per 5 horses)

Stream Fencing (29*); 1 fence system ~1,100ft

What do Ag-BMPs cost?

- (LE-1T*, Exclusion fencing, alternative water and cross fencing = $15,000
- (WP-2T*, Exclusion fencing and hardened crossing = $8,000
- Non-cost-share cattle fencing* = $15,000
- Non-cost-share for horses* = $30,000
- Horse compost shed = $3,000
- Horse waste management education program ~$21,500
- Conservation Tillage = $100/ac
- Vegetated Buffer on Cropland = $1/foot
- Prescribed Grazing Plan = $150/ac
  (AKA improved pasture management)

Average local system length: 1,100 ft

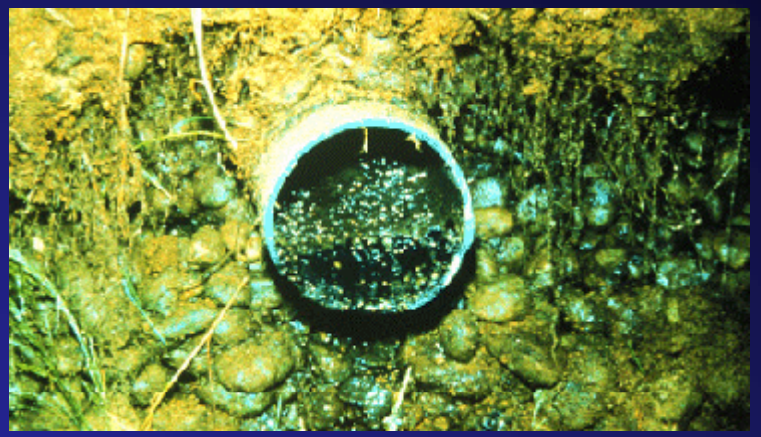
Pathway to Ag BMPs

- Identify the issue you would like to address on your property even if cost-share is not available for practices and:

- Contact your local SWCD
  - Henrico County Residents – Henricopolis SWCD
    - 804-501-5175
    - www.co.henrico.va.us/swcd
  - Hanover County Residents – Hanover-Caroline SWCD
    - 804-537-5225
    - http://www.co.hanover.va.us/soilandwater/
  - New Kent County and Charles City County Residents – Colonial SWCD
    - 757-645-4895
    - http://www.colonialswcd.net/

Residential Best Management Practices Recommended for "Waste"

- 35 straight pipe corrections and 387 failing septic system corrections
  - 100% source load efficiency
  - 100 Septic Repairs
  - 75 Septic Installed/Replaced
  - 2 Alternative Systems
  - 230 Sewer Connections
- 5,234 Septic Tank Pump-outs



Community Pet Waste Pick-up Education Program

- 50% source load efficiency
- 50 Dog Waste Pick-Up Stations
- 102,145 Educational Mailings
- 2 million Dog Waste Bag Refills

What do "Waste" BMPs Cost?

Septic System Pump-out = $450ea
(one pumpout every 5 yrs)

Install conventional septic system = $8,000ea

Install alternative system = $20,000ea

Repair failing septic system = $3,500ea

Connect to the sewer system = $32,000ea

Pet Waste Education Program ~$370,000
(waste station, bags, composters, installation and maintenance and distribution of educational materials)

Values estimated by the residential working group

Pathway to a Functioning Waste Treatment System

- Identify what kind of system you have:
  - Sewer – you have a monthly bill
  - Septic System – you have a drainfield
  - Straight pipe
    - Pipe with cloudy liquid discharging to stream? Deposits below pipe?
- Is your drainfield functioning properly?
  - Wet or mushy area above drain field?
  - Surfacing water is dark colored?
  - Grass greener along drainfield lines?

- Contact your local VDH
  - Henrico Co: 804-501-4530
  - Hanover Co: 804-365-4313
  - New Kent Co: 804-966-9623
  - Charles City Co: 804-829-6702
- VDH will then work with the homeowner to address the issue

"Green" Residential Best Management Practices Recommended

- 50 acres of residential areas treated with bioretention
  - 90% land use efficiency
- 250 acres of residential areas treated with rain gardens
  - 70% land use efficiency
- 10,000 feet of vegetated buffer in residential areas
  - 100% buffer efficiency, 50% upland efficiency

Costs of "Green" Residential BMPS?

Bioretention areas can be used in parking areas to collect and treat stormwater (Source: University of Maryland, 2000)

Pervious Bioretention (35) = $19,000 (per developed acre treated)

Impervious Bioretention (15) = $94,000 (per developed acre treated)

Pervious Rain Gardens (175) = $19,000 (per developed acre treated)

Impervious Rain Gardens (75) = $94,000 (per developed acre treated)

Vegetative Buffers (10,000)= $1 (per linear foot)

Stage I: How much will the first five years cost?

Agricultural BMPs = $ 3.94 M

Residential Waste BMPs = $ 11.19 M

Green Residential BMPs = $ 12.47 M

Pet Waste Pick-up Program = $ 0.28 M

Technical Assistance= $ 0.80 M

TOTAL = $ 28.68 M

Approximately $6 million annually over 5 years

What if we still don't meet reduction goals?

↓

Stage II (second 5-years):

Need based on evaluation of BMP installation progress and water quality monitoring results

Recommended Agricultural BMPs

- 47 Waste Composting sheds for Horse Manure
  - 99% source load efficiency
- 10,000 feet of Vegetated Buffer on Cropland
  - 100% buffer efficiency, 50% upland efficiency
- 11,622 acres Prescribed Grazing Plan and Implementation
  - 61% land use efficiency
- 29 systems of non-cost-share fencing for horses
  - 100% source efficiency
- ADD 3,000 acres of cropland treated with retention ponds ($200/ac treated)
  - 70% load use efficiency
- ADD 13,850 acres of pasture treated with retention ponds ($200/ac treated)
  - 70% load use efficiency

Recommended Residential BMPs

- Continue Septic System Pumpouts
- Continue Pet Waste Education Program
  - 99% source load efficiency

- Continue installation of rain gardens, vegetated buffers and bioretention
- ADD 2,510 Pet Waste Composters ($50 each)

Recommended "Green" Residential BMPs

- 150 acres treated with bioretention
  - 90% land use efficiency
- 250 acres treated with rain gardens
  - 70% land use efficiency
- 10,000 feet of vegetated buffer
  - 100% buffer efficiency, 50% upland efficiency
- ADD 5,000 acres treated with retention ponds ($1356/ac treated)
  - 70% land use efficiency

Stage II: *If needed…*

- If the practices outlined in Stage I are not enough, additional practices needed and costs are:

Second 5-years

Agricultural BMPs	$ 6.17 M
Residential Waste BMPs	$ 2.36 M
Green Residential BMPs	$ 23.39 M
Pet Waste Pick-up Program	$ 0.09 M
Technical Assistance	$ 0.80 M
TOTAL	**$ 32.81 M**

Approximately $6.5 million annually over 5 years

Residential Measures

BMPs	Unit	Stage I Units	Stage II Units	Cost per Unit	Stage I Cost ($)	Stage II Cost ($)	Total Cost
Septic Systems Pump-outs (RB-1)	System	5,234	5,234	$450	$2,355,300	$2,355,300	$4,710,600
Septic System Repair (RB-3)	System	100	0	$3,500	$350,000	$0	$350,000
Septic System Installation/Replacement (RB-4)	System	75	0	$8,000	$600,000	$0	$600,000
Alternative Waste Treatment System Installation (RB-5)	System	2	0	$20,000	$40,000	$0	$40,000
Sewer Connection	System	245	0	$32,000	$7,840,000	$0	$7,840,000
Pet Waste Pick-up/Composters Program	Program	75%	25%	$370,976	$278,232	$92,744	$370,976
Retention Ponds – Mixed (pervious and impervious)	Acre-Treated	0	5,000	$1,356	$0	$6,780,000	$6,780,000
Rain Gardens Level 1 Design - Pervious	Acre-Treated	175	175	$19,000	$3,325,000	$3,325,000	$6,650,000
Rain Gardens Level 1 Design – Impervious	Acre-Treated	75	75	$94,000	$7,050,000	$7,050,000	$14,100,000
Bioretention Facilities Level 1 Design - Pervious	Acre-Treated	35	105	$19,000	$665,000	$1,995,000	$2,660,000
Bioretention Facilities Level 1 Design - Impervious	Acre-Treated	15	45	$94,000	$1,410,000	$4,230,000	$5,640,000
Vegetated Buffers	Feet	10,000	10,000	$1	$10,000	$10,000	$20,000
Residential Education Program	Program	100%	0%	$11,500	$11,500	$0	$11,500
Technical Assistance	FTE*	5	5	$80,000	$400,000	$400,000	$800,000
Subtotal					**$24,335,032**	**$26,238,044**	**$50,573,076**

Agricultural Measures

BMPs	Unit	Stage I Units	Stage II Units	Cost per Unit	Stage I Cost ($)	Stage II Cost ($)	Total Cost
Livestock Exclusion with Riparian Buffer (LE-1T)	System	13	0	$15,000	$195,000	$0	$195,000
Stream Protection (WP-2T)	System	2	0	$8,000	$16,000	$0	$16,000
Non-cost-share Cattle Fencing	System	41	0	$15,000	$615,000	$0	$615,000
Non-cost-share Horse Fencing	System	29	29	$30,000	$870,000	$870,000	$1,740,000
Prescribed Grazing Plan and Implementation (NRCS 528)	Acre	11,623	11,622	$150	$1,743,450	$1,743,300	$3,486,750
Conservation Tillage – Cropland (SL-15A)	Acre	419	0	$100	$41,900	$0	$41,900
Riparian Buffers – Cropland	Feet	10,000	10,000	$1	$10,000	$10,000	$20,000
Retention Ponds - Cropland	Acre-Treated	0	3,000	$200	$0	$600,000	$600,000
Retention Ponds - Pasture	Acre-Treated	0	13,850	$200	$0	$2,770,000	$2,770,000
Streamside Fence Maintenance	Feet	0	8,939	$3.50	$0	$31,287	$31,287
Waste Storage/Composting/Education – Horse	System	143	47	$3,000 per system + $21,500	$450,500	$141,000	$591,500
Technical Assistance	FTE	5	5	$80,000	$400,000	$400,000	$800,000
Subtotal					**4,341,850**	**6,565,587**	**10,907,437**

Promotable BMPs

BMPs whose implementation result in the reduction of bacteria but whose efficiencies are not measureable. These BMPs cannot be included in models to determine the number needed to meet water quality standards. Examples of Promotable BMPs:

- Rain Barrels (reduce stormwater runoff)
- Equipment Rental to improve pasture conditions (Henricopolis SWCD)
- Education program to help control resident geese populations in areas of the watershed
- Tree-planting
- Bayscaping

Potential Funding Sources

- **Federal Funds**
  - Federal Clean Water Act 319 Incremental Funds
  - Community Development Block Grant Program
  - Conservation Reserve Program (CRP)
  - Conservation Reserve Enhancement Program (CREP)
  - Environmental Quality Incentives Program (EQIP)
  - Wildlife Habitat Incentive Program (WHIP)
  - Wetland Reserve Program (WRP)
  - EPA Environmental Education Grants

- **State Funds**
  - Clean Water Revolving Loan Fund
  - VA Agricultural (Ag) Best Management Practices (BMPs) Cost-Share Program
  - VA Ag BMPs Tax Credit Program
  - VA Ag BMPs Loan Program
  - VA Small Business Environmental Assistance Fund Loan Program
  - VA Water Quality Improvement Fund

Potential Funding Sources

- **Local Funds**
  - Counties
  - Indoor Plumbing Rehabilitation program
- **Private Funds**
  - Chesapeake Bay Stewardship Fund
  - Southeast Rural Community Assistance Project (SE/R-CAP)
  - National Fish and Wildlife Foundation
  - Virginia Environmental Endowment Fund
  - Local Businesses

Education and Outreach Ideas

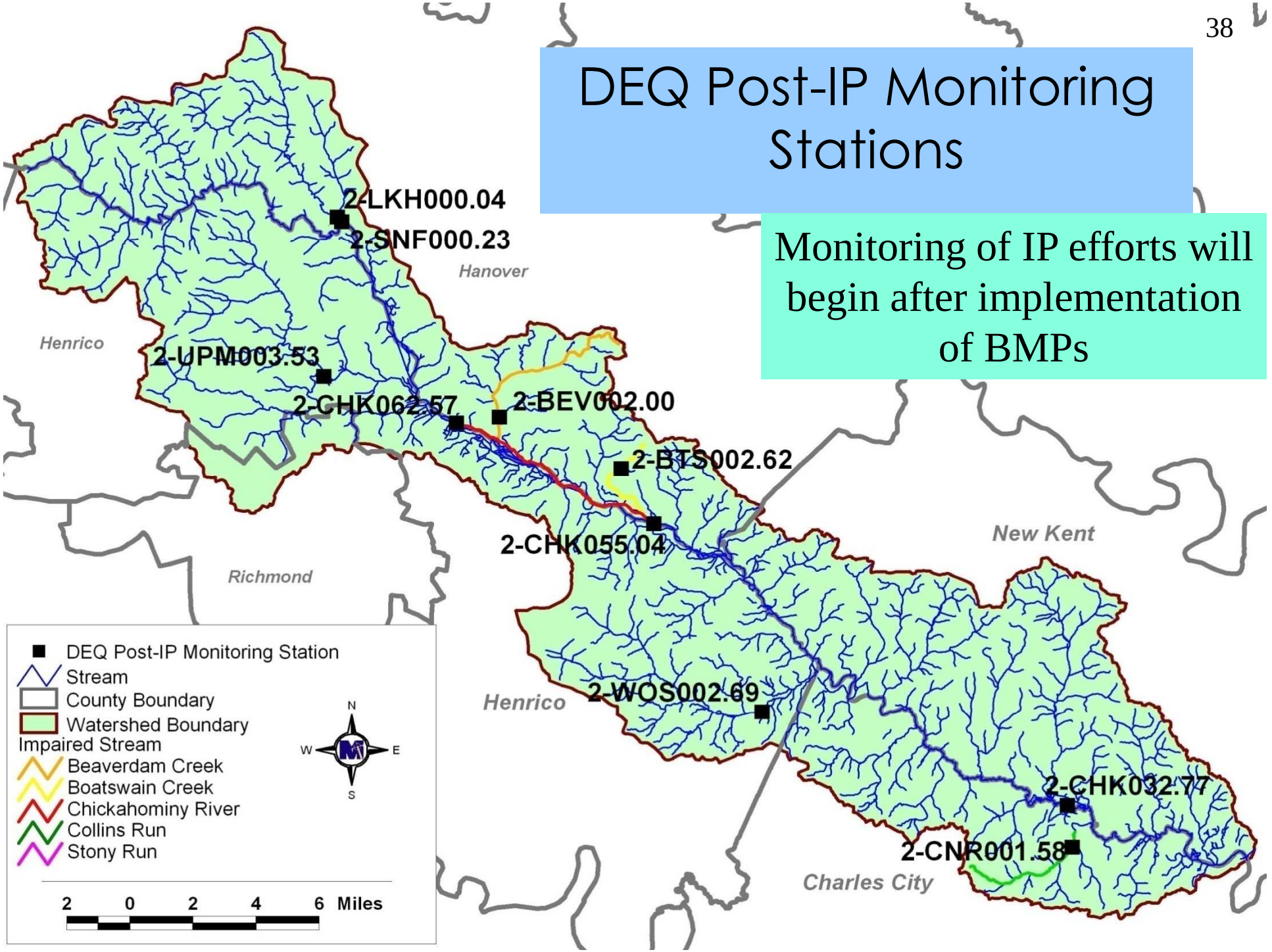
- Pet waste stations with signs reminding pet owners to pick-up after their pets
- Newsletters and mailings about issue
- Ads in newspapers, radio, TV
- Education at community events
- Distribute pet waste education materials to Vets/Pounds/Shelters
- Work with septic system installers to distribute information to homeowners
- Develop horse waste management program with info mailings and workshops

Tracking Achievements

- *Tracking of Ag implementation:* by DCR and SWCD
- *Tracking of Res implementation:* by local VDH / Localities / DEQ / DCR
- *Tracking of water quality improvements:* DEQ conducts water quality monitoring
- Monitoring and implementation data should be correlated
- Citizen monitoring

DEQ Post-IP Monitoring Stations

Monitoring of IP efforts will begin after implementation of BMPs



What's Next?

- 30 day comment period ends 3/11/2013
  - Send comments to Margaret Smigo, DEQ
- Plan approval by the State Water Control Board and review by EPA
- Soil and Water Conservation Districts will continue providing technical assistance for Ag BMPs
- Citizens can take action:
  - Dispose of Pet Waste Properly
  - Maintain your Septic System
  - Join a Local Watershed Group – Volunteer!
  - Plant Native Trees and Shrubs in the Riparian Corridor
  - Join a citizen monitoring group

Comment Period ends on 3/11/2012

Send Comments To:

Margaret Smigo
TMDL Projects Coordinator
Department of Environmental Quality
Margaret.Smigo@deq.virginia.gov
4949-A Cox Road Glen Allen VA 23060
Phone: (804) 527-5124
Fax: (804)-527-5106

The plan can be found at the following web address:

http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLImplementation/TMDLImplementationPlans.aspx